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Energy Efficiency and Renewable Energy

federal energy management program

NREL PV Projects FUPWG Meeting: “Going Costal for Energy Efficiency”

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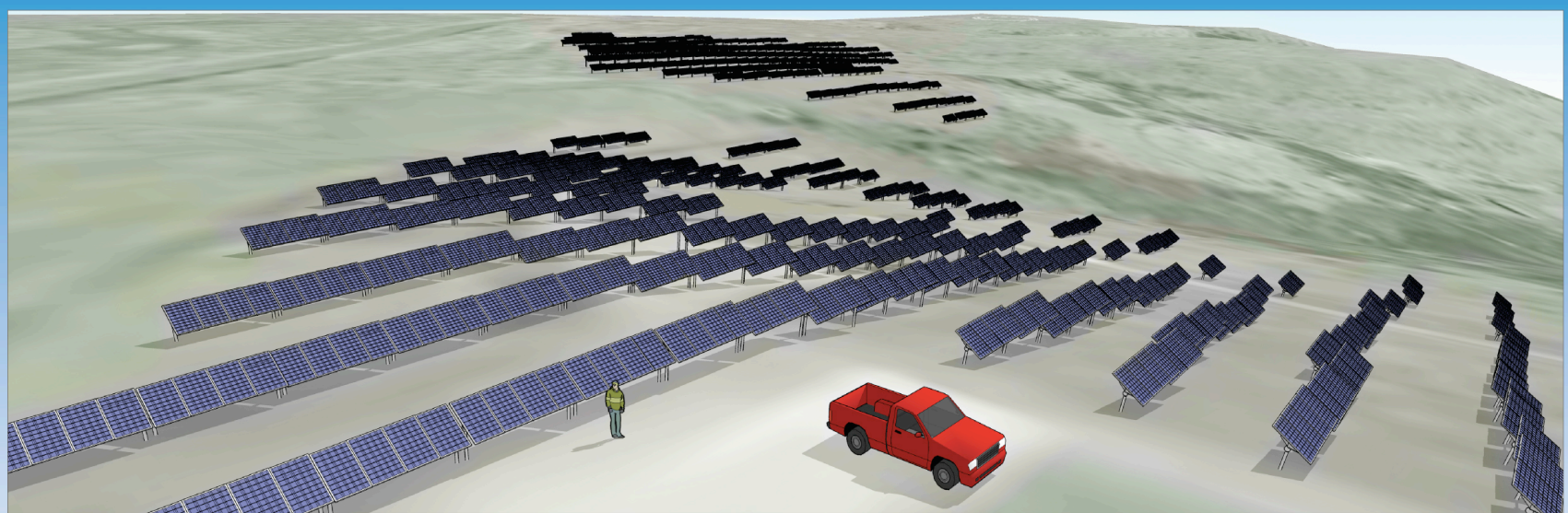
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Mesa Top PV Project





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Mesa Top PV Project

- 750 kWdc (1,200,000 kWh) one-axis tracking PV system
 - Grid connected (NREL “side of the meter”)
 - Milestones
 - Agreements: January 2008
 - Operation: August 2008



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Solar Rewards Program

- CO statute requires solar resource acquisitions by IOU of 20% renewables by 2020 (4% solar “carve out”)
- Xcel acquisitions made through RFP (bid) process
 - Selection based on SO-REC* price
- Solar Rewards Program
 - Three tiers (NREL system applicable tier: 100kw-2MW system size)
 - Rebate: \$2/watt up to \$200K
 - Bidders compete based on SO-REC price offering over 20-year term
- Third round RFP currently open (5-6 MW sought)
- Bid environment: oversubscribed (downward pressure on price)

***Solar Energy and Customer-Sited Renewable Energy Credits (\$/MWH)**



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Sample SOREC Bid Form

**Xcel
Guidance:
What matters
is the \$/REC
price!**

Bid #2

Size of PV in kW 1000
Rebate \$ 200,000
kWh degradatic 0.995

Project Year	RECs	\$/REC Bid	REC \$/Year
1	1,471.20	100.00	147,120.00
2	1,463.84	100.00	146,384.40
3	1,456.52	100.00	145,652.48
4	1,449.24	100.00	144,924.22
5	1,442.00	100.00	144,199.59
6	1,434.79	100.00	143,478.60
7	1,427.61	100.00	142,761.20
8	1,420.47	100.00	142,047.40
9	1,413.37	100.00	141,337.16
10	1,406.30	100.00	140,630.47
11	1,399.27	100.00	139,927.32
12	1,392.28	100.00	139,227.69
13	1,385.32	100.00	138,531.55
14	1,378.39	100.00	137,838.89
15	1,371.50	100.00	137,149.70
16	1,364.64	100.00	136,463.95
17	1,357.82	100.00	135,781.63
18	1,351.03	100.00	135,102.72
19	1,344.27	100.00	134,427.21
20	1,337.55	100.00	133,755.07
NPV @ 7.38%			
Rebate \$			200,000.00
REC Purchase \$			1,460,431.53
Total \$			1,660,431.53
RECs			14,604.32
\$/REC			
			113.69
rlm:solar:rfp:dec 2006:rfp bid evaluation analysis 121106			



“Wiring Diagram”

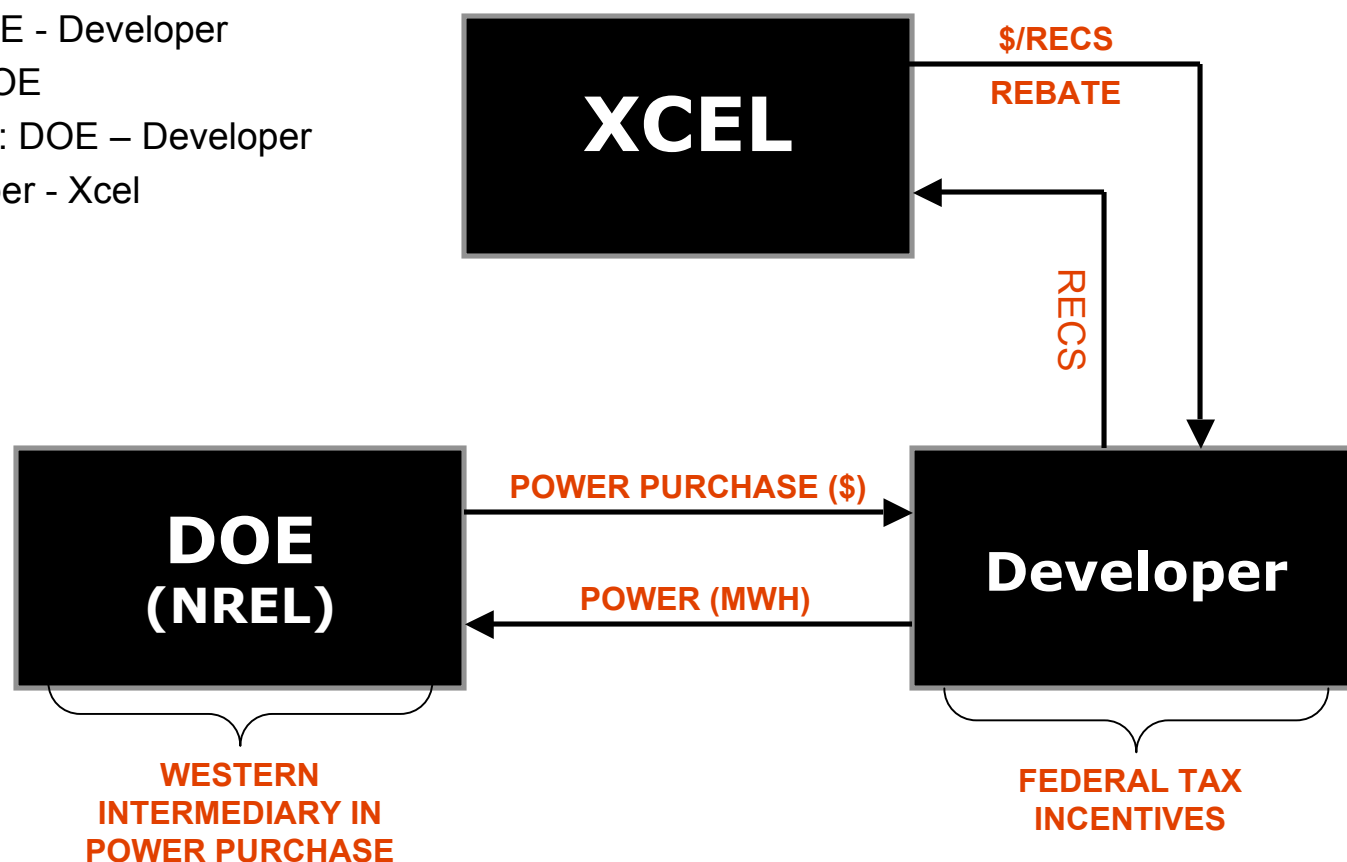
Agreements

PPA: Western/DOE - Developer

IAA: Western – DOE

Easement/Access: DOE – Developer

SO-REC: Developer - Xcel





Agreements/Comments

- PPA (Western-developer)
 - Contracting Agent: Western (20 year term)
 - Inter-Agency Agreement (Western-DOE GO)
 - No electricity price premium
- Land Use Agreement (DOE GO-developer)
 - Easement/Access (10 year DOE term limitation)
 - No financial consideration
 - Real Property involvement
- SO-REC Agreement (Xcel-developer)
 - 20 year term
 - Risk of REC delivery resides with developer
- Other
 - National Environmental Policy Act (NEPA) requirements
 - REC ownership (Applicability to RE goal requires REC “swap”)
(http://www1.eere.energy.gov/femp/pdfs/epact05_fedrenewenergyguid.pdf)



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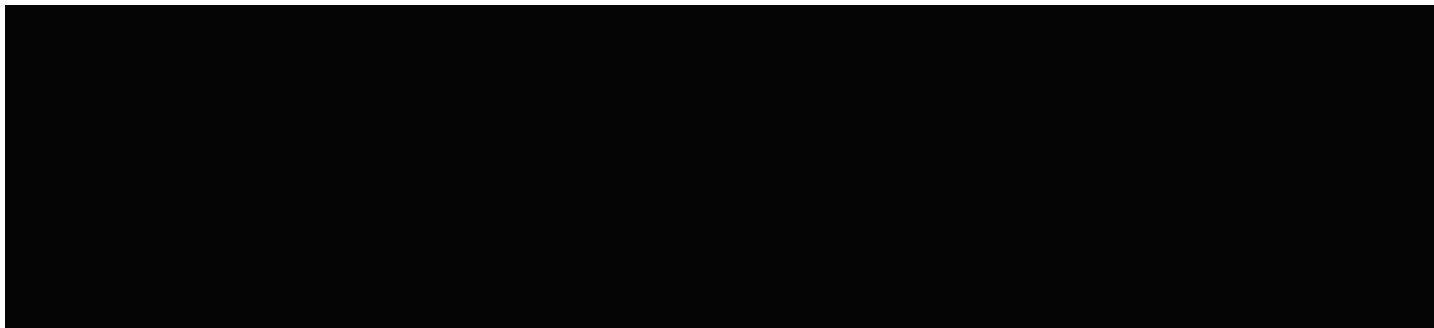
Phase II PV PPA Projects

- Responding to third round of Xcel SolarRewards Program RFPs
- Utilizing PPA through developer
 - Replicates PPA process utilized with Mesa Top PV project
- Three projects under consideration (NWTC-1MW and STM (FTLB "Boneyard" - 350kW, S&TF-190kW))
- Status
 - Four developers selected (August 2007 RFQ)
 - Phase II proposals received April 2
 - Initial developer selection completed with project site selection and negotiations initiated April 10
 - Bid date to Xcel April 18 with Xcel decisions expected by June 6, 2008



Evaluation

- Key evaluation parameters
 - Annual electrical production (MWh)
 - Electricity price + escalation (cents/kWh)
 - SOREC price + escalation (cents/kWh)
- Proposal comparison basis
 - Sum of electricity and SOREC prices (sample below)
 - Discounted assessments of price streams over agreement term (=developer revenues)





Evaluation

Pre-proposal - Estimated Cost Premiums for Successful Xcel Bids

Bldg. Pad	PV System Size kW	Annual output kWh	Annual Premium at \$0.01/kW h Extra	Annual Premium at \$0.02/kW h Extra	Annual Premium at \$0.03/kWh Extra	Annual Premium at \$0.04/kWh Extra	Annual Premium at \$0.05/kWh Extra	Annual Premium at \$0.06/kWh Extra
SERF	44	62232	\$622	\$1,245	\$1,867	\$2,489	\$3,112	\$3,734
S&TF	193	27008 1	\$2,701	\$5,402	\$8,102	\$10,80 3	\$13,50 4	\$16,20 5
Boneyard	350	49070 0	\$4,907	\$9,814	\$14,72 1	\$19,62 8	\$24,53 5	\$29,44 2
	Projection resulting in winning SO-REC bid							
	20 year incremental cost (not discounted)			\$196K			\$271K	\$75K

Benchmark: NWTC anticipated to be “winner” at
1MW (ground mount), \$0.07/kWh and \$0.20/kWh



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Tools

- NREL Solar Advisor Model (SAM)
<https://www.nrel.gov/analysis/sam/>
 - Evaluates several types of financing (residential to utility-scale) for variety of solar technologies/cost models
- Custom solar proposal evaluation spreadsheets

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Thank You!

QUESTIONS?

